ASSET PRICING IN THE ASIAN REGION

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Abstract
In this asset pricing study, three questions are addressed. First, does the multifactor model of Fama and French (1993) capture returns in Asian stock markets in a meaningful manner? Second, do small firms and high book-to-market equity firms carry a risk premia? Third, can competing hypotheses (such as survivorship bias, data-snooping and irrationality) explain the multifactor model results? The answers from this study are as follows: The multifactor model of Fama and French (1993) provides a parsimonious description of the cross-section of returns, with the relationship between firm size, book-to-market equity and average stock returns being robust for Asian markets over the 1990s. We find that small firms and high book-to-market equity firms carry a risk premia, providing opportunities for mean-variance efficient investors. Finally, our findings reject the claim that the results of multifactor model can be explained by competing hypotheses for the Asian experience.

JEL Classification: G120, G150
Keywords: Multifactor asset pricing models, Asian region, size effect, book-to-market equity effect.

1. INTRODUCTION

IS RISK AND EXPECTED RETURN LINEARLY RELATED? This question has been the source of continuing debate for academics and market participants since the seminal contribution of Sharpe (1964). Although some controversy still exists, the majority of studies now conclude that the beta of the capital asset pricing model (CAPM) is lacking in cross-sectional explanatory power (Fama and French 1992). For instance, Chan, Hamao and Lakonsihok (1991) find that firm characteristics (such as size, book-to-market equity, earnings and cash flow ratios) explain the cross-section of average stock returns in Japan with greater precision than the CAPM. In addition, Chui and Wei (1998) find that the relationship between average stock returns and beta is weak in the emerging stock markets of the Asia-Pacific region[1]. Worse, Chui and Wei (1998) find that the relationship between stock returns and market beta is "flat, and stock returns are more related to two firm characteristics: size and book-to-market ratio." These studies do not provide a promising picture of the CAPM, concluding that other factors, apart from beta, do a superior job of capturing the cross-section of average stock returns.

This rather bleak view of the academy's understanding of the trade-off between risk and expected return is reinforced by Campbell's (2000) recent critique of the current direction of asset pricing research, particularly that of Fama and French (hereafter FF) (1993). Campbell (2000) argues that FF describe deviations from the CAPM "parsimoniously using multi-

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[1] Chui and Wei (1998) investigate the relationship between expected return and market beta, book-to-market equity and size in Hong Kong, Korea, Malaysia, Taiwan and Thailand.

factor models in which the factors are chosen atheoretically to fit the empirical evidence." Moreover, a number of researchers have suggested that the findings of FF (1996) are spurious and are simply the result of data-snooping (Lo and MacKinlay 1990, White 2000).

In this paper, we examine the relationship, between average stock returns and an overall market factor, size and book-to-market equity in four emerging markets in the Asian region. In addition to testing whether the model of FF (1993) captures the cross-section of returns in an meaningful manner, we are motivated to respond to the survivorship bias hypothesis advanced by Kothari, Shanken and Sloan (1995), data-snooping hypothesis advanced by Black (1993) and Mackinlay (1995) and the irrationality hypothesis advanced by Lakonishok, Shleifer and Vishny (1994) and Haugen (1995).

Additionally, the issue of what constitutes a perfect risk measure is also a motivation for our paper. Malkiel (1999) states that there is still much debate within the academic community on risk measurement and much more empirical testing needs to be done. In a similar vein, Campbell, Lo and Mackinlay (1997) state that the usefulness of multifactor models[2] will not be fully known until sufficient new data become available to provide a true out-of-sample check on their performance. Arshanapalli, Coggin and Doukas (1998) state that without testing the robustness of the FF findings outside the environment in which they were originally found, it cannot be determined whether these empirical regularities are merely spurious correlations that may not be confirmed across capital markets. Davis, Fama and French (2000) neatly summarize the current mood of the debate stating that "the acid test of a multifactor model is whether it explains differences in average returns".

2. PHILOSOPHY OF ASSET PRICING

The catalyst of the philosophical debate currently surrounding the topic of asset pricing has a long tradition in financial economics[3]. The issue of paradigms within paradigms and how scholars should judge the interrelatedness of a body of thought characterise not only the asset-pricing debate, but also the philosophy of human experience.

Roll (1977) argues that the limitation of asset pricing research is that there are no, in principle, tests of asset pricing models as the market portfolio is unobservable. Following Roll's (1977) argument, deductions made from investigating the trade-off between risk and expected return are ambivalent between rejection of the null hypothesis and a bad model problem. This stalemate in philosophical position requires resolution. It is proposed that the CAPM is not a Popperean (1959) conjecture, but rather a Kuhnian (1970) paradigm or a Lakatosian (1978) hard core principle. We propose a philosophical conception of asset pricing that reflect the ideas of Kuhn (1970) and Lakatos (1978) that engenders tests of more narrowly based predictions which, if successful in rejecting the null hypothesis, are classified as anomalies or puzzles. Following a Popperean (1959) scientific process, rejection of the

[2] Significant contributions have been made by Banz (1981), Basu (1983), Rosenberg, Reid and Lanstein (1985), Fama and French (1992, 1993, 1995, 1996 and 1998), Black (1993), Lakonishok, Shleifer and Vishny (1994), Kothari, Shanken and Sloan (1995), Mackinlay (1995), Haugen (1995), Kandel and Stambaugh (1996), Jagannathan and Wang (1996), Barber and Lyon (1997), Daniel and Titman (1997), Knez and Ready (1997), Berk (2000), Pastor and Stambaugh (2000) and Liew and Vassalou (2000).

[3] Blaug (1980), Bronfenbrenner (1971), Coats (1969), Dillard (1978), Kunin and Weaver (1971), Merton (1973b) and Schumpeter (1954) document the history, sociology, philosophy and revolutions of economic investigation.

null hypothesis leads to evidence in support of an extreme alternate hypothesis – the inability of systematic risk to explain the cross-section of returns.

The proposed philosophical conception based on Kuhn (1970) and Lakatos (1978) provides a framework to move scholarship on the topic of asset pricing forward. A collection of anomalies or puzzles will allow the emergence of a new paradigm. Kuhn (1970) states that a crisis may end with the emergence of a new candidate for paradigm and the ensuing battle over its acceptance. Financial economists, led by FF (1993, 1996), have introduced a new story in the asset-pricing debate - a multifactor model, as a replacement for the one factor CAPM. However, the transition from the old paradigm to the new paradigm is not yet complete. Researchers are currently in the process of gathering more evidence on the robustness of the multifactor model with this paper considering the applicability to the Asian region. In the interim, investors need to consider this new evidence and its implications for investment portfolios. Following a Kuhnian (1970) process, we would expect that few adherents of the CAPM would recant, but the next generation of finance researchers, would accept the modern paradigm of multifactor asset pricing models. Like old soldiers, paradigms don't die, but simply fade away.

3. DATA AND METHODOLOGY

Monthly stock returns and the accounting data, are obtained from the panel database, maintained by Primark Corporation.[4] We investigate, the relationship between the expected return of a certain portfolio, and the overall market factor, firm size (ME) and book-to-market equity ratio (BE/ME) by employing the following unconditional model:

$$R_{pt} - R_{ft} = a_i + b_i (R_{mt}-R_{ft}) + siSMB + hiHML + \varepsilon_{it} \qquad (1)$$

R_{pt} is the average return of a certain portfolio (S/L, S/M, S/H; B/L, B/M and B/H). R_{ft} is the risk-free rate observed at the beginning of each month. SMB is the difference each month between the return on a portfolio of small stocks and the portfolio of big stocks; HML is the difference each month between the return on a portfolio of high book-to-market equity stocks and the return on a portfolio of low book-to-market equity stocks. The factor loadings b_i, s_i and h_i are the slopes in the time-series regression. As a confirmatory measure, we also investigate the seasonal behavior of risk premiums by separating equation (1) for January and non-January months.

Table 1 - Sample Periods, Risk Free Rates and Number of Firms

Ountry	Sample Period	Risk Free Rate	Number of firms
Hong Kong	01/01/94-12/99	Hong Kong Interbank 1 year rate	463
Korea	01/01/92-12/99	Korea NCD 91 Days	288
Malaysia	01/01/92-12/99	Base Lending rate	454
Philippines	01/01/95-12/99	Interbank Call loan rate	166

[4] Primark Corporation is a global information services company. We used Datastream a Primark brand to obtain the data for this study.

Table 2 - Portfolio Aggregation Procedure for Six Portfolios formed on Size and Book-to-Market Equity Ratios for Hong Kong, Korea, Malaysia and Philippines

At the end of December of each year t stocks are assigned to two portfolios of size (Small and Big) based on whether their December Market equity (ME) defined as closing price times Number of shares outstanding is above or below the median ME. The same stocks are allocated in an independent sort to three-book equity to market equity portfolios (Low, Medium, and High) based on the breakpoints for the bottom 33.33 percent and top 66.67 percent. Low portfolios consist of firms with breakpoints less than 33.33 percent of median book-to-market equity. High portfolios consist of firms with breakpoints more than 66.67 percent of median book-to-market equity and the balance firms are assigned the medium portfolio.

Six ME-BE/ME portfolios are formed at the intersection of the two size portfolios and three book-to-market equity portfolios. The six portfolios formed are (S/L, S/M, and S/H; B/L, B/M, and B/H). Value-weight monthly returns on the six portfolios are calculated from the following January to December. The explanatory variables **R_M, SMB, and HML** are defined as follows: R_M (market return) is the value-weight market return on all stocks in the six portfolios and includes the negative book equity stocks which were excluded from the sample while forming BE/ME portfolios. SMB (Small minus Big) is the difference each month between the average of the returns of the three small stock portfolios (S/L, S/M, and S/H) and the average of the returns of the three big portfolios (B/L, B/M, and B/H). HML (High minus Low) is the difference between the average of the returns of the two high BE/ME portfolios (S/H, B/H) and the average of the returns on the two low BE/ME portfolios (S/L, B/L).

We define book equity (BE) as the book value of common shareholder's equity plus the balance sheet deferred taxes (if any) and minus the book value of preferred stocks. The BE/ME ratio used to form portfolios in December of each year t is the book common equity for the fiscal year ending in calendar year t-1 / market equity at the end of December of t-1. While forming portfolios we exclude negative book equity firms, as they do not have meaningful explanations. We include firms only with ordinary equity for portfolio construction purposes.

4. EMPIRICAL RESULTS

A. Tests on the Six Size-BE/ME sorted portfolios

A.1 Hong Kong

Table 3, Panel A reports the average excess returns on the six size to book-to-market equity sorted portfolios for Hong Kong. The table shows that small stocks generate higher returns than big stocks and high book-to-market equity stocks generate higher returns than low book-to-market equity stocks. We also report that the standard deviations associated with the overall market factor are higher, than the standard deviations of SMB and HML.

We suggest that the premium for the size effect and the distressed firm effect is compensation for the risk missed by the Capital Asset Pricing Model. As a strategy of investing in small stocks and high book-to-market equity stocks generate higher returns, we deduct that such firms carry a risk premia.

Table 3 - Panel A: Summary Statistics (Hong Kong), Mean Monthly Returns (Full Sample)
Period: 12/93 to 12/99

PORTFOLIO	RPTRFT	RMRFT	SMB	HML
S/L	-0.3378 (11.3011)[7]	0.1634 (9.1769)	0.8276 (5.1502)	0.3108 (4.0608)
S/M	1.3324 (11.5624)	0.1634 (9.1769)	0.8276 (5.1502)	0.3108 (4.0608)
S/H	0.4299 (10.5573)	0.1634 (9.1769)	0.8276 (5.1502)	0.3108 (4.0608)
B/L	-0.3168 (10.4924)	0.1634 (9.1769)	0.8276 (5.1502)	0.3108 (4.0608)
B/M	-0.2787 (10.9846)	0.1634 (9.1769)	0.8276 (5.1502)	0.3108 (4.0608)
B/H	-0.4629 (10.1817)	0.1634 (9.1769)	0.8276 (5.1502)	0.3108 (4.0608)

Table 3 - Panel B (Hong Kong): $R_{pt}-R_{ft} = a_i+b_i(R_{mt}-R_{ft})+siSMB+hiHML+\varepsilon_{it}$

Portfolio	a	b	s	h	R^2	F	DW
S/L	-1.562 (-1.942)[8]	0.976 (9.892)	1.557 (8.845)	-0.723 (-3.627)	0.65	45.254	2.118
S/M	-0.008 (-0.90)	0.984 (8.774)	1.590 (7.948)	-0.199 (-0.878)	0.57	32.464	2.328
S/H	-1.040 (0.163)	0.998 (11.037)	1.400 (8.675)	0.478 (2.617)	0.66	47.900	1.906
B/L	-0.743 (-1.021)	0.998 (11.171)	0.486 (3.049)	-0.447 (-2.476)	0.67	48.761	1.994
B/M	-0.676 (-0.791)	0.984 (9.378)	0.418 (2.230)	-0.350 (-1.650)	0.60	34.108	2.344
B/H	-1.265 (-1.593)	0.976 (10.015)	0.644 (3.702)	0.353 (1.792)	0.60	33.934	2.186

Table 3, Panel B reports the coefficients of the three-factor model. The results of Panel B show that the intercept, *a* coefficient, is statistically indistinguishable from zero for all six size to book-to-market equity sorted portfolios. Merton (1973) states that standard asset-pricing models produce intercepts that are statistically indistinguishable from zero. Hence, if the model of (1) is parsimonious and describes expected return in a meaningful manner, the intercepts should be close to zero. Our results confirm the findings of Merton (1973).

We also observe that the overall market factor, *b* coefficient, is close to one for all six size to book-to-market equity sorted portfolios. The *s* coefficient is positive and significant at the 1 per cent level for the three small portfolios (S/L, S/M and S/H). The *s* coefficient for the (B/L and B/M) portfolios are diminishing positive and significant at the 5 per cent level. The s coefficient for (B/H) portfolio is significant at the 1 percent level. The *h* coefficient for (S/L) portfolio is negative and significant at the 1 per cent level but not significant for the (S/M) portfolio.

Importantly, the *h* coefficient is positive and significant at the 5 per cent level for the (S/H) portfolio, suggesting that high book-to-market equity stocks have positive loadings on the HML. The *h* coefficient for (B/L and B/M) portfolios are negative but become positive for (B/H) portfolio again suggesting that high book-to-market equity firms have positive

[7] Standard Deviation in parentheses
[8] T Statistics in parentheses

loadings on the HML. The average R^2 for the six size to book-to-market equity sorted portfolios is 0.625 which implies that the independent variables explain 62.5% of the variation in the cross-section of average stock returns.

A.2 Korea

Table 4, Panel A reports the average excess returns on the six size to book-to-market equity sorted portfolios for Korea. The table shows that small stocks and high book-to-market equity stocks have higher returns, than big stocks and low book-to-market equity stocks. The results for Korea are similar to that of Hong Kong in that small firms and high book-to-market equity firms carry a risk premia. We also report that the standard deviations associated with the overall market factor are significantly higher than the standard deviations of the two-arbitrage portfolios SMB and HML. We propose that the size and value premium are a compensation for the risk factors not captured by the CAPM. It is important to note that the returns for the overall market factor are negative. In essence, the two-arbitrage portfolios outperform the broad market portfolio.

Table 4 - Panel A: Summary Statistics (Korea), Mean Monthly Returns (Full Sample)
Period: 12/91 to 12/99

PORTFOLIO	RPTRFT	RMRFT	SMB	HML
S/L	0.9785 (13.2693)[9]	-0.1741 (10.6184)	0.6907 (6.6301)	0.3959 (5.9905)
S/M	0.7615 (13.4651)	-0.1741 (10.6184)	0.6907 (6.6301)	0.3959 (5.9905)
S/H	1.0138 (14.0033)	-0.1741 (10.6184)	0.6907 (6.6301)	0.3959 (5.9905)
B/L	-0.2385 (10.7771)	-0.1741 (10.6184)	0.6907 (6.6301)	0.3959 (5.9905)
B/M	0.3249 (13.1120)	-0.1741 (10.6184)	0.6907 (6.6301)	0.3959 (5.9905)
B/H	0.5952 (13.2614)	-0.1741 (10.6184)	0.6907 (6.6301)	0.3959 (5.9905)

Table 4-(continued) Panel B (Korea): $R_{pt}-R_{ft} = a_i+b_i(R_{mt}-R_{ft})+siSMB+hiHML+\varepsilon_{it}$

Portfolio	a	b	s	h	R^2	F	DW
S/L	0.182 (0.289)[10]	0.983 (16.237)	1.312 (12.739)	0.156 (1.399)	0.79	119.486	1.862
S/M	-0.238 (-0.385)	1.010 (17.057)	1.348 (13.393)	0.615 (5.654)	0.80	130.985	2.224
S/H	-0.351 (-0.605)	0.938 (16.813)	1.513 (15.983)	1.218 (11.903)	0.84	166.823	2.034
B/L	-0.485 (-0.912)	0.916 (17.925)	0.478 (5.503)	0.192 (2.042)	0.77	108.351	2.292
B/M	-0.002 (-0.42)	1.044 (15.716)	0.400 (3.543)	0.655 (5.364)	0.74	91.272	1.714
B/H	0.108 (0.186)	0.970 (17.347)	0.295 (3.100)	1.142 (11.108)	0.82	144.815	2.058

Table 4, Panel B reports the coefficients of the three-factor model for Korea. The results of Panel B, show that the intercept, *a* coefficient, is statistically indistinguishable from zero for

[9] Standard Deviation in parentheses
[10] T Statistics in parentheses

all six size to book-to-market equity sorted portfolios. We also observe that the overall market factor, *b* coefficient, is highly significant for all six portfolios. The *s* coefficient is positive and significant at the 1 per cent level and increases monotonically for the three small portfolios (S/L, S/M and S/H). The *s* coefficient is positive and significant at the 1 per cent level but decreases monotonically for the three big portfolios.

The *h* coefficient increases monotonically for the three-small stock portfolios and is significant at the 1 percent level. The *h* coefficient, for the three big portfolios, behave in an identical manner to the three small stock portfolios, in the sense, that high book-to-market equity firms have higher slopes than low book-to-market equity firms. We also observe that the average R^2 for the six size to book- to-market equity sorted portfolios is 0.793.

A.3 Malaysia

Our findings for Malaysia are similar to that of Hong Kong and Korea in that the mean monthly returns of the two mimic portfolios SMB and HML are higher than the overall market return. It is also important to note that the standard deviations of the two mimic portfolios are lower than the standard deviation of the overall market factor. Again, we propose that small and high book-to-market equity firms, are more riskier, than big and low book-to-market equity firms.

Table 5 - Panel A: Summary Statistics (Malaysia), Mean Monthly Returns (Full Sample)
Period: 12/91 to 12/99

PORTFOLIO	RPTRFT	RMRFT	SMB	HML
S/L	2.2732 (16.5311)[11]	0.1608 (10.8488)	1.4751 (5.3244)	1.4746 (6.0860)
S/M	1.9495 (15.8556)	0.1608 (10.8488)	1.4751 (5.3244)	1.4746 (6.0860)
S/H	3.0988 (17.6584)	0.1608 (10.8488)	1.4751 (5.3244)	1.4746 (6.0860)
B/L	-0.1367 (10.9776)	0.1608 (10.8488)	1.4751 (5.3244)	1.4746 (6.0860)
B/M	1.3231 (14.2259)	0.1608 (10.8488)	1.4751 (5.3244)	1.4746 (6.0860)
B/H	1.7098 (16.4746)	0.1608 (10.8488)	1.4751 (5.3244)	1.4746 (6.0860)

[11] Standard Deviation in parentheses

Table 5 - Panel B (Malaysia): $R_{pt}-R_{ft} = a_i+b_i(R_{mt}-R_{ft})+siSMB+hiHML+\varepsilon_{it}$

Portfolio	a	b	s	h	R^2	F	DW
S/L	-0.825 (-1.257)[12]	0.918 (14.137)	1.801 (15.286)	0.200 (1.757)	0.87	215.724	2.180
S/M	-1.074 (-1.817)	0.922 (15.771)	1.384 (13.050)	0.565 (5.521)	0.89	248.778	2.203
S/H	-0.676 (-1.310)	0.964 (18.920)	1.482 (16.031)	0.972 (10.899)	0.93	425.738	2.467
B/L	-0.856 (-2.086)	0.901 (22.185)	0.427 (5.803)	-0.003 (-0.533)	0.89	247.078	2.326
B/M	-0.502 (-0.927)	0.985 (18.389)	0.582 (5.987)	0.548 (5.847)	0.88	237.346	2.341
B/H	-1.215 (-2.143)	0.918 (16.364)	0.657 (6.457)	1.226 (12.489)	0.90	297.080	2.144

Table 5, Panel B reports the coefficients for Malaysia. The intercept, *a* coefficient, is statistically indistinguishable from zero for all six portfolios. We observe that the *b* coefficient is close to one for all six portfolios. The *s* coefficient is positive and significant at the 1 percent level for the three small stock portfolios. The *s* coefficient for the three big portfolios is diminishing when compared with the three small stock portfolios. However, they are positive and significant at the 1 percent level.

The *h* coefficient increases monotonically for the three small stock portfolios and is significant at the 1 percent level. It is interesting to note that the *h* coefficient is negative for the (B/L) portfolio, but becomes positive and significant for the (B/M and B/H) portfolios. Our results are consistent with that of FF (1996) who observe that low book-to-market equity firms have diminishing positive or negative slopes and high book-to-market equity firms have higher slopes on the HML.

A.4 Philippines

Table 6, Panel A reports the mean monthly returns for Philippines. Our findings for Philippines are similar to that of the other markets investigated in this paper in that the mean monthly returns of the two mimic portfolios SMB and HML are higher than the excess return on a broad market portfolio. In addition, the standard deviations of the two mimic portfolios are lower than the standard deviation of the overall market factor. Again, we propose that small and high book-to-market equity firms, are more riskier, than big and low book-to-market equity firms.

[12] T Statistics in parentheses

Table 6 - Panel A: Summary Statistics (Philippines), Mean Monthly Returns (Full Sample)
Period: 12/94 to 12/99

PORTFOLIO	RPTRFT	RMRFT	SMB	HML
S/L	-0.2974 (11.9649)[13]	-1.2743 (10.0421)	1.6853 (8.2010)	1.2811 (6.6452)
S/M	2.0564 (14.5217)	-1.2743 (10.0421)	1.6853 (8.2010)	1.2811 (6.6452)
S/H	1.6319 (12.0353)	-1.2743 (10.0421)	1.6853 (8.2010)	1.2811 (6.6452)
B/L	-1.1413 (14.0298)	-1.2743 (10.0421)	1.6853 (8.2010)	1.2811 (6.6452)
B/M	-0.4391 (11.4480)	-1.2743 (10.0421)	1.6853 (8.2010)	1.2811 (6.6452)
B/H	-0.0085 (12.0978)	-1.2743 (10.0421)	1.6853 (8.2010)	1.2811 (6.6452)

Table 6 - Panel B (Philippines): $R_{pt}-R_{ft} = a_i+b_i(R_{mt}-R_{ft})+siSMB+hiHML+\varepsilon_{it}$

Portfolio	a	b	s	h	R^2	F	DW
S/L	-0.103 (-0.128)[14]	0.846 (10.066)	0.917 (8.850)	-0.516 (-4.293)	0.75	61.322	2.036
S/M	0.578 (0.466)	1.062 (8.190)	1.245 (7.791)	0.572 (3.085)	0.62	30.979	2.378
S/H	1.310 (1.200)	0.975 (8.539)	0.693 (4.926)	0.390 (2.893)	0.58	25.366	2.080
B/L	0.927 (0.899)	1.103 (10.221)	-0.118 (-0.886)	-0.363 (-2.348)	0.70	48.147	2.179
B/M	0.831 (0.756)	0.791 (6.878)	-0.009 (-0.682)	-0.007 (-0.470)	0.52	20.606	2.202
B/H	0.002 (0.032)	0.989 (11.197)	0.006 (0.637)	0.805 (6.372)	0.75	55.440	2.131

Table 6, Panel B reports the coefficients for Philippines. The intercept, *a* coefficient, is statistically indistinguishable from zero for all six portfolios. We observe that the market factor, *b* coefficient, is close to or greater than one for all six portfolios. The *s* coefficient is positive and significant at the 1 percent level for the three small stock portfolios. The *s* coefficient for (B/L and B/M) portfolios are negative and not statistically significant. The *s* coefficient for (B/H) portfolio is positive but not significant. Since, the small firms have higher slopes and load positively on SMB we deduct that small firms are riskier than big firms

The *h* coefficient is negative and significant at the 1 percent level for (S/L) portfolio. The *h* coefficient becomes positive and significant for (S/M and S/H) portfolios. The *h* coefficient is negative for (B/L and B/M) portfolios but becomes positive for the (B/H) portfolio. The positive HML slopes of high book-to-market equity firms raise their return variances and imply higher average returns. This is consistent with the findings of FF (1996) who observe that small and high book-to-market equity firms have positive slopes on SMB and HML respectively, while big and low book-to-market equity firms have diminishing positive or negative slopes on SMB and HML.

B. Size and Value Premium
B.1 Hong Kong

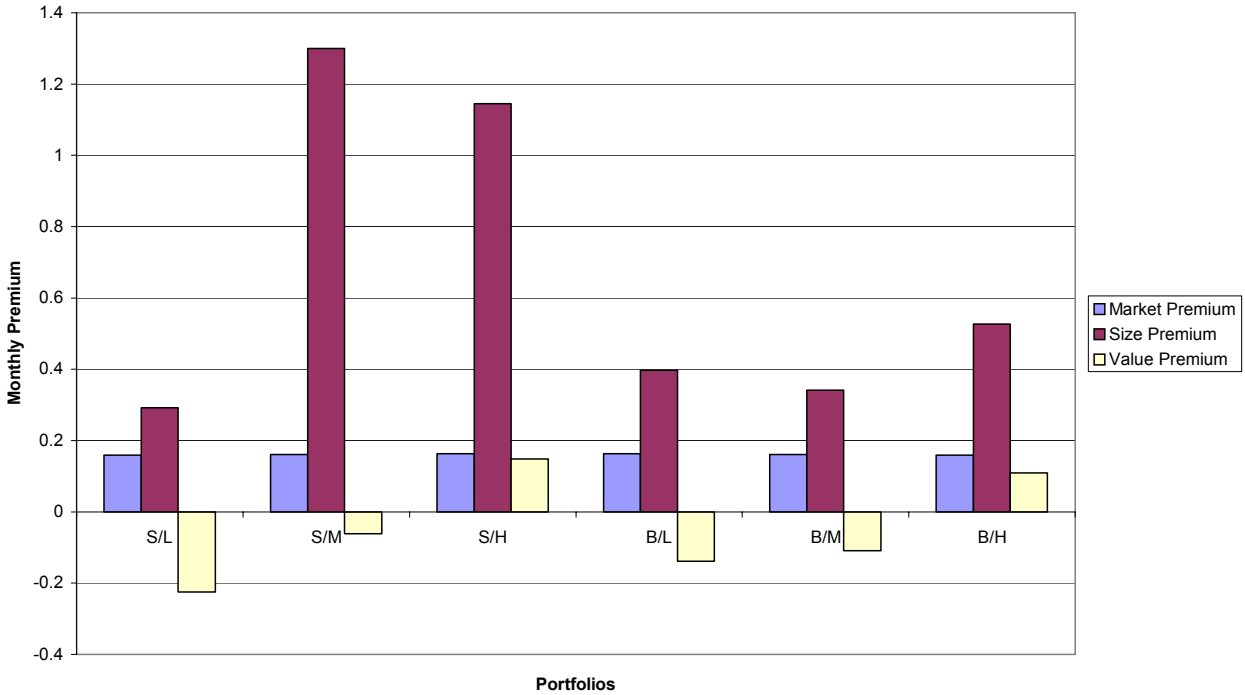
[13] Standard Deviation in parentheses
[14] T Statistics in parentheses

Our findings suggest that size and value premium is real and pervasive. The (S/H) portfolio generates the highest size and value premium of 1.144 percent per month (t-statistic = 8.675) and 0.1485 percent per month (t-statistic = 2.617) respectively. The value premium is negative for (S/L and S/M) portfolios but become positive for (S/H) portfolio. The value premium is negative for (B/L and B/M) portfolios but become positive for (B/H) portfolio. Since, the value premium is negative for low and medium book-to-market equity firms, but positive for high book-to-market equity firms, we propose that high book-to-market equity firms are riskier than low and medium book-to-market equity firms.

Table 7 - Market, Size and Value Premium Hong Kong (Full Sample)

Portfolio	Market Premium (%)	Size premium (%)	Value Premium (%)
S/L	0.1594 (9.892)[15]	0.2920 (8.845)	-0.2247 (-3.627)
S/M	0.1607 (8.774)	1.2999 (7.948)	-0.0618 (-0.878)
S/H	0.1630 (11.037)	1.1446 (8.675)	0.1485 (2.617)
B/L	0.1630 (11.171)	0.3973 (3.049)	-0.1389 (-2.476)
B/M	0.1607 (9.378)	0.3417 (2.230)	-0.1087 (-1.650)
B/H	0.1594 (10.015)	0.5265 (3.702)	0.1097 (1.792)

Figure 1.0
Market, Size and Value Premium (Hong Kong)



[15] T Statistics in parentheses

B.2 Korea

We find that small firms and high book-to-market equity firms are more riskier than big and low book-to-market equity firms. Our findings indicate that (S/H) portfolio generates the highest size and value premium of 1.0450 percent per month (t-statistics = 15.983) and 0.4822 percent per month (t-statistics = 11.903) respectively. We also find that there is a monotonic increase in the size premium for the three small stock portfolios. The size premium for the three big stock portfolios is diminishing when compared with the three small stock portfolios.

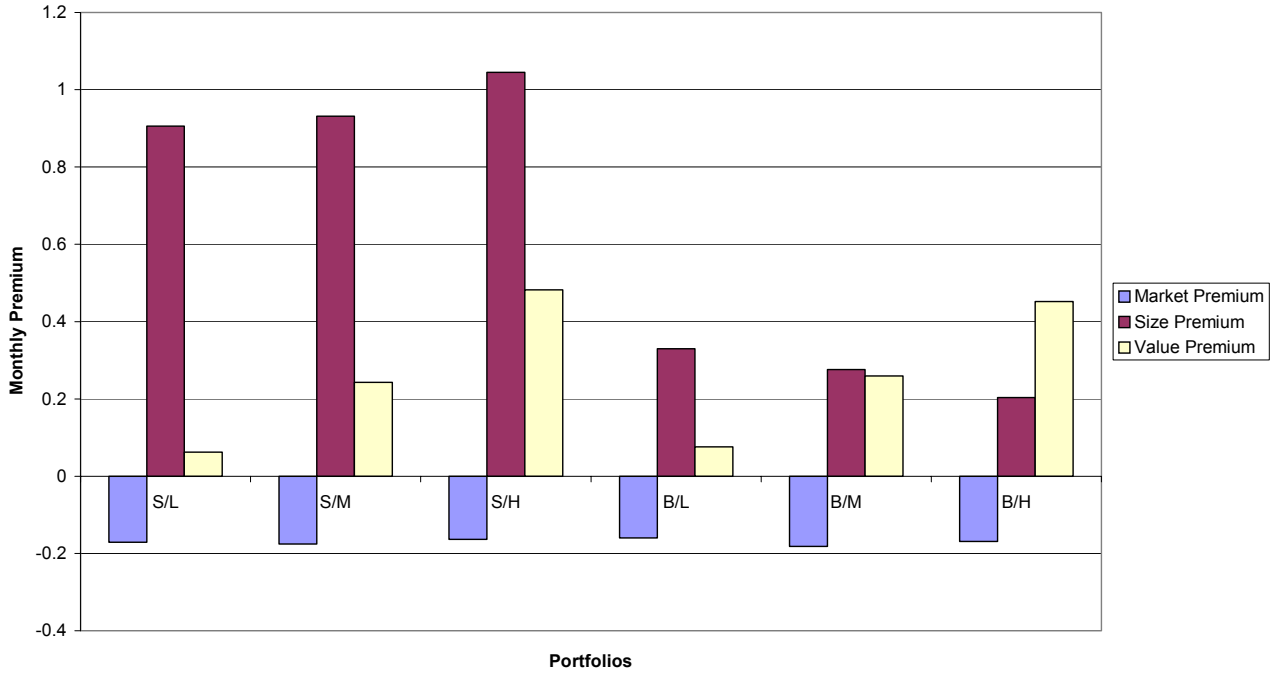
The value premium also increases monotonically for the three small stock portfolios in that the high book-to-market equity stocks outperform the low and medium book-to-market equity stocks. The value premium for the three big stock portfolios behave in an identical manner to the small stock portfolios. .

Table 8 - Market, Size and Value Premium Korea (Full Sample)

Portfolio	Market Premium (%)	Size premium (%)	Value Premium (%)
S/L	-0.1711 (16.237)[16]	0.9061 (12.739)	0.0617 (1.399)
S/M	-0.1758 (17.057)	0.9310 (13.393)	0.2424 (5.654)
S/H	-0.1633 (16.813)	1.0450 (15.983)	0.4822 (11.903)
B/L	-0.1594 (17.925)	0.3301 (5.503)	0.0760 (2.042)
B/M	-0.1817 (15.716)	0.2762 (3.543)	0.2593 (5.364)
B/H	-0.1688 (17.347)	0.2037 (3.100)	0.4521 (11.108)

[16] T Statistics in parentheses

Figure 2.0
Market, Size and Value Premium (Korea)



B.3 Malaysia

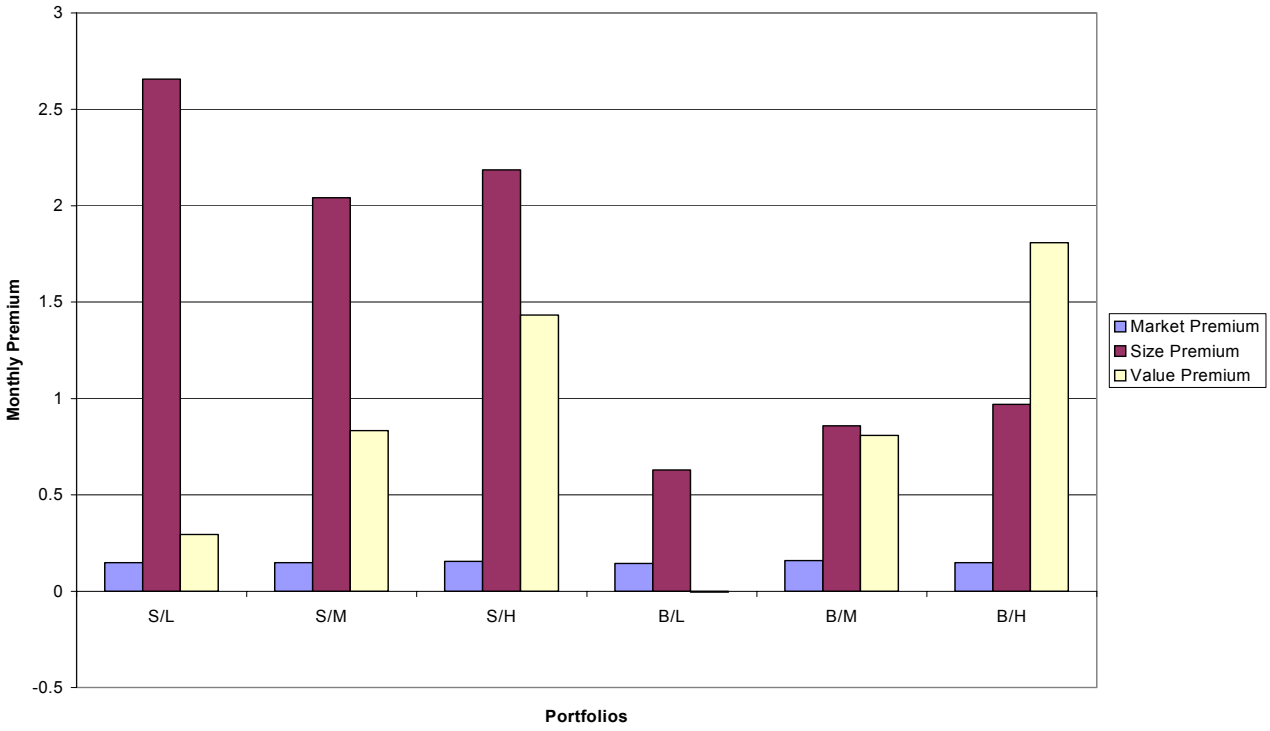
Our findings for Malaysia are similar to that of Hong Kong and Korea in that small and high book-to-market equity firms carry a risk premia. Our findings indicate that (S/H) portfolio generates the highest size premium of 2.1860 percent per month (t-statistics = 16.031). The size premium for the three big stock portfolios is diminishing when compared with the three small stock portfolios. Our findings document a clear size effect in the sense that small firms outperform big firms. The (S/H) portfolio generates a value premium of 1.4333 percent per month (t-statistics = 10.899). Our findings also document a clear book-to-market equity effect in that high book-to-market equity firms outperform low book-to-market equity firms.

Table 9 - Market, Size and Value Premium Malaysia (Full Sample)

Portfolio	Market Premium (%)	Size premium (%)	Value Premium (%)
S/L	0.1476 (14.137)[17]	2.6566 (15.286)	0.2949 (1.757)
S/M	0.1482 (15.771)	2.0415 (13.050)	0.8331 (5.521)
S/H	0.1550 (18.920)	2.1860 (16.031)	1.4333 (10.899)
B/L	0.1448 (22.185)	0.6298 (5.803)	-0.0044 (-0.533)
B/M	0.1583 (18.389)	0.8585 (5.987)	0.8080 (5.847)
B/H	0.1476 (16.364)	0.9691 (6.457)	1.8078 (12.489)

[17] T Statistics in parentheses

Figure 3.0
Market, Size and Value Premium (Malaysia)



B.4 Philippines

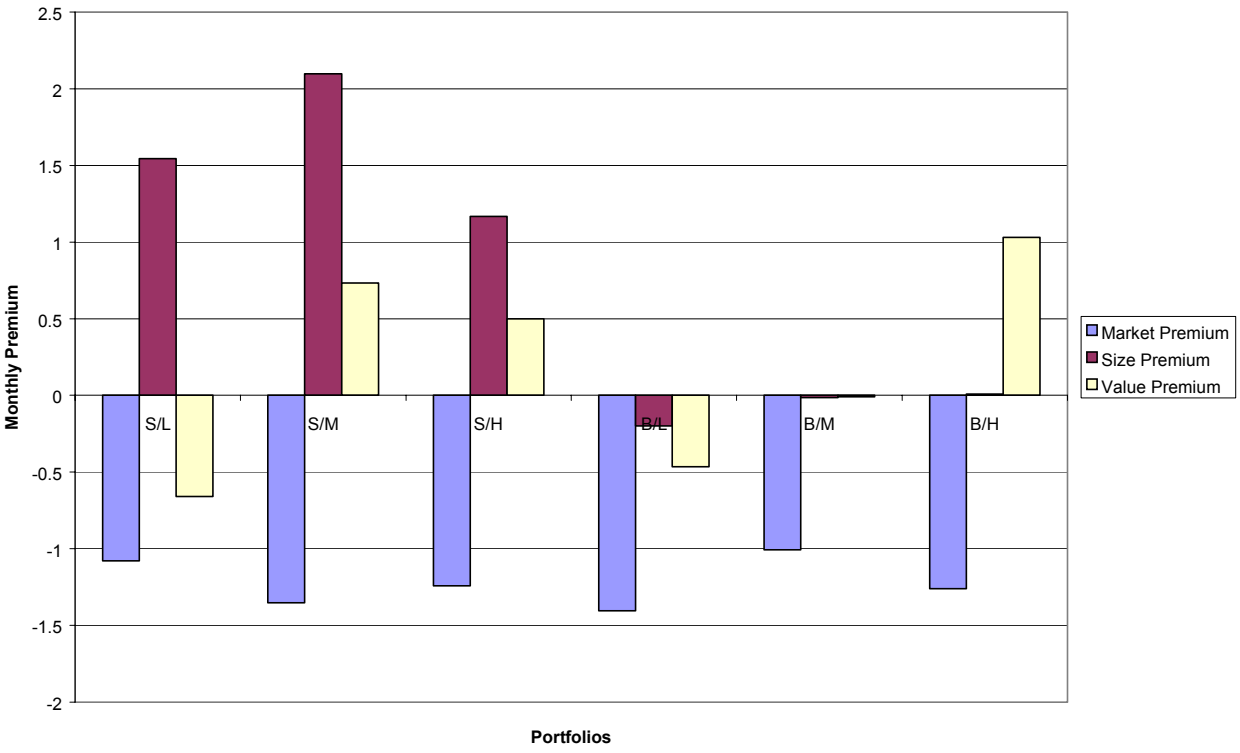
Our results suggest that size and value premium in stock returns are robust. Our findings for Philippines are similar to that of Hong Kong, Korea and Malaysia in the sense that small firms and high book-to-market equity firms outperform big firms and low book-to-market equity firms. We find that the three small stock portfolios outperform the three big stock portfolios. In relation to value premium we find that (S/L) has a negative premium while (S/M and S/H) portfolios have positive premium. Portfolios (B/L and B/M) have negative value premium while (B/H) portfolio generates a positive premium. Therefore, our results are again consistent with empirical findings that document a size and value premium.

Table 10 - Market, Size and Value Premium Philippines (Full Sample)

Portfolio	Market Premium (%)	Size premium (%)	Value Premium (%)
S/L	-1.0780 (10.066)[18]	1.5454 (8.850)	-0.6610 (-4.293)
S/M	-1.3533 (8.190)	2.0981 (7.791)	0.7327 (3.085)
S/H	-1.2424 (8.539)	1.1679 (4.926)	0.4996 (2.893)
B/L	-1.4055 (10.221)	-0.1988 (-0.886)	-0.4650 (-2.348)
B/M	-1.0079 (6.878)	-0.0151 (-0.682)	-0.0089 (-0.470)
B/H	-1.2602 (11.197)	0.0101 (0.637)	1.0312 (6.372)

[18] T Statistics in parentheses

Figure 4.0
Market, Size and Value Premium (Philippines)



C. Diagnostics

We employed the celebrated Durbin-Watson *d* test for detecting autocorrelation. We do not observe any evidence of autocorrelation[19] for any of the six size to book-to-market equity sorted portfolios for the markets investigated in this paper. The computed *d* statistic is higher than the upper bound value at the 1 per cent level. Therefore, we do not reject the null hypothesis of no aurtocorrelation among the disturbances entering the regression function. Additionally, we conduct tests to determine if the assumption concerning no evidence of multicollinearity is violated. The tests reveal no evidence of multicollinearity among the regressors using the condition index, tolerance and variance inflation factors[20]. Hence, we do not reject the null hypothesis of no multicollinearity among the regressors in the model.

D. Seasonal Behavior of Risk Premiums

Tests have focused on the existence of trends arising from seasonal factors such as monthly seasonal, daily seasonal and patterns arising during the course of the day. It has been documented that stock returns, especially returns on small sized stocks, are significantly higher in January than in other months. Keim (1983) was the first to document the size-seasonality effect, which has since been termed the 'turn-of-the-year' effect. Keim (1983)

[19] Chatterjee and Price (1991) and Gujarati (1999) suggest that the null hypothesis of no autocorrelation should not be rejected when the computed *d* is greater than the upper bound limit.

[20] Gujarati (1995) observes that there is no evidence of multicollinearity if the condition index and the variance inflation factor are below 10. We observe that the condition index and the variance inflation factors for the full sample, sample excluding the January month and the January month only sample (not reported here for reasons of space) do not exceed 10 for any of the size-book-to-market equity sorted portfolios. We therefore do not reject the null hypothesis of no multicollinearity among the regressors.

observed that about half of the size premium to small firms occurs in January, and more interestingly, half of this effect occurs in the first five days of the new calendar year.

Roll (1983) observed that stocks with negative returns during the prior year (December) had higher returns in January. The results also indicated a small firm effect beyond the tax selling and volatility hypothesis. Roll (1983) concluded that because of transaction costs, arbitrageurs must have not been eliminating the January tax-selling anomaly.

FF (1993) suggest that it is standard in tests of asset-pricing models to look for the turn of the year effect. Therefore, we investigated the seasonal behavior of risk premiums by separating our unconditional model in equation (1) for January and non-January months. We do not find any evidence of seasonality effect and hence conclude that the multifactor model is robust throughout the sample period.

We also observe that the whole sample behaves in an identical manner to the sample excluding January month. More importantly, the coefficients other than the overall market factor are not statistically significant in the January month only sample for all four-equity markets. Therefore, we reject the claim that the size and value premium are exclusively a January phenomenon.

E. The role of survivorship, data-snooping and irrationality hypothesis

FF (1992) find that firm size and book-to-market equity provide a simple and powerful characterization of the cross-section of average stock returns for the 1963-1990 period. More importantly, they observe that the relation between market betas and average returns is flat even when beta is the only explanatory variable. Further, FF (1996) state that the anomalies largely disappear if a three-factor model was employed.

However, some financial economists do not share this view and are largely unconvinced about the robustness of the Fama and French results. For instance, Kothari, Shanken and Sloan (1995), (hereafter KSS) argue that the results are influenced by survivorship bias hypothesis; Black (1993) and Mackinlay (1995) argue that the results are simply a result of data snooping while Lakonishok, Shleifer and Vishny (1994) and Haugen (1995) suggest that the distress premium is irrational.

KSS (1995) suggest that there is a linear relation between the cross-section of expected stock returns and beta. They also observed that the relation between BE/ME and returns is much weaker than projected by FF in their influential paper in 1992. KSS (1995) state that when annual returns are employed in the estimation of beta, there is substantial compensation for beta risk over the 1941 to 1990 period. KSS (1995) state that the data obtained from COMPUSTAT is affected by a selection bias and provides indirect evidence. Using an alternative data source, S&P 500, from 1947-1987, KSS (1995) find that the book-to-market equity effect is weakly related to average returns. Hence, they suggest that the results of FF are influenced by survivorship bias. However, we reject this hypothesis, as our data source does not have the practice of back-filling financial information of firms that have delayed reporting their financial statements.

In response, to the data-snooping hypothesis, we concur with Barber and Lyon (1997) who suggest that the most obvious means of evaluating the data-snooping hypothesis is to

investigate the robustness of the multifactor model in different time periods and for different samples. Hence, we investigate the robustness of the multifactor model for four different capital markets with different time periods.

Lakonishok, Shleifer and Vishny (1994) and Haugen (1995) state that the distress premium is irrational, in the sense, that the difference between the returns of high and low book-to-market equity stocks is too high to be explained by rational asset-pricing. We concur with FF (1996) who state that if the distress premium is close to an arbitrage opportunity the standard deviation of HML should be small. However, we find that the standard deviation of HML is very similar to that of SMB for markets investigated in this paper. In sum, we reject the claim that the three hypotheses can explain the variation in average stock returns.

5. CONCLUSIONS AND IMPLICATIONS

Our findings suggest that value stocks have higher returns than growth stocks in the emerging markets investigated in this paper. Our findings also show that investors who hold small stocks realize higher returns than investors who hold big stocks. Hence, we concur with FF (1992) who state that small firms and high book-to-market equity firms carry a risk premium. Therefore, mean variance efficient investors should be able to achieve higher returns by simply shifting their portfolios in favor of these characteristics. As these results are an out of sample check on the performance of multifactor models, we propose that the size and value premium is real and pervasive.

The findings of this paper have major implications for (a) corporate finance, in the spirit of the cost of capital. This is in the sense that the CAPM tends to underestimate the cost of capital for small firms; (b) investors who seek mean-variance efficient portfolios; and (c) the returns of professional fund managers. The findings suggest that benchmark measures based on the CAPM alone are inadequate to evaluate performance of equity managers who invest in a wide choice of assets besides investing in large firms. Therefore, a multifactor model, such as the one tested here, is an appropriate model rather than the one factor CAPM.

In addition, our results reject the survivorship bias hypothesis notion advanced by Kothari, Shanken and Sloan (1995), data-snooping hypothesis, advanced by Black (1993) and Mackinlay (1995) and the irrationality hypothesis of Lakonishok, Shliefer and Vishny (1994) and Haugen (1995). Given the findings presented in this paper, the validity of these hypotheses is questioned.

We also find that markets are not irrational, as the factors tested in this paper help explain the variation in average stock returns better than the beta. In our view, the CAPM is simply misspecified as the risk factors investigated in this paper are not captured by the CAPM. Hence, investors need to consider this evidence and the implications for investment portfolios.

In sum, we are more than convinced that asset pricing is rational and so is market rationality. The area of risk measurement is bound to witness many improvements over the coming period as there is no single measure of risk that is likely to capture the variation in the cross-section of average stock returns. A recent direction taken by Malkiel and Xu (2000) find that idiosyncratic volatility is useful in explaining the cross-section of average stock returns. They

observe that even after controlling for size and book-to-market equity factors, idiosyncratic risk could be priced to compensate investors who are unable to hold the market portfolio.
We suggest that future studies in asset-pricing: (a) conduct additional tests on the robustness of the multifactor model, to deepen our understanding of the reasons behind the risk premia; and (b) to investigate whether the behavior of stock returns mirrors the behavior of earnings. Future research in this area should make an attempt to provide an economic story for size and book-to-market equity effects, rather than choosing arbitrary risk variables and relating them to stock returns.

For instance, FF (1995) state that the size and book-to-market equity ratio are related to profitability, in the United States, in the sense that small firms tend to have lower earnings on book equity. They also observed that high book-to-market equity firms were less profitable than low book-to-market equity firms. However, very little evidence is available on this relationship from other markets. This is an issue we will explore in our next paper.

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